



ANIMAL HEALTH

EXECUTIVE SUMMARY

Kansas is home to a large concentration of public and private entities in the animal health and nutrition sectors including research and production of therapeutics, diagnostics, biologics, and nutrition and feed products. Kansas sits within the KC Animal Health Corridor, a region which houses more than 300 animal health companies that account for 56 percent of total worldwide animal health, diagnostics and pet food sales. Several established research facilities and organizations can be found in northeast Kansas, including the Biosecurity Research Institute, and the decision to construct the National Bio and Agro-Defense Facility (NBAF) in Manhattan, Kan., is a significant advantage for the region. Livestock production in Kansas is the largest contributor to the agriculture industry, representing a wide breadth of farmers, ranchers and agribusinesses across the state, and requires substantial preparation and planning for potential animal health emergencies. The presence of strong agriculture educational resources and an expansive transportation network together create a sound foundation for animal health success in Kansas.

Identifying the barriers and challenges that exist in the animal health sector will be key to future growth in Kansas. Policy issues on the state and federal level will have a significant impact at all levels of animal health, from the use of antibiotics in food-producing animals to animal disease vaccines. Developing the high tech facilities and the workforce to expand research and development in animal health will continue to be a challenge, especially as the global issues of trade, population growth and emerging diseases stretch the resources of existing organizations. Amid these challenges, the industry also faces increased pressure from consumers which is often influenced by misleading information.

Although Kansas is well established as a leader within the KC Animal Health Corridor, continuing this growth will require collaborative efforts from private and public stakeholders to develop strategies to overcome these challenges facing the industry. Expanding educational opportunities and developing partnerships between animal health companies and research facilities will enhance growth of existing businesses as well as attract new enterprises. Finally, it will be critical to maintain communication with policy makers to ensure they remain focused on protecting animal health as well as public health and the global food supply while encouraging economic development within the animal health industry.



STATUS

Kansas is not only among the nation's top states for raising livestock, it is also home to a large concentration of public and private entities in the animal health and nutrition sectors including research and production of therapeutics, diagnostics, biologics, and nutrition and feed products to support the industry. In fact, Kansas is located within the KC Animal Health Corridor, which is home to more than 300 animal health companies that account for 56 percent of total worldwide animal health, diagnostics and pet food sales. According to the Biotechnology Industry Organization (BIO), the Kansas bioscience industry employs more than 13,000 people across approximately 810 establishments, with a heavy concentration of agricultural feedstock and chemicals, and in research, testing and medical labs.

Kansas was also selected to be home for the National Bio and Agro-Defense Facility (NBAF), a state-of-the-art, biocontainment laboratory for the study of diseases that threaten both America's animal agricultural industry and public health. NBAF, which is being constructed adjacent to K-State's campus in Manhattan, will strengthen the nation's ability to conduct research, develop vaccines, diagnose emerging diseases and train veterinarians. The decision to locate NBAF in Kansas is further confirmation that Kansas not only has a strong foundation and presence in the current animal health and bioscience sectors, but that the state's prominence in this critical sector of animal and human health will continue into the future.

Though significantly smaller than the human health care market, animal health products are required to undergo similar testing and adhere to strict regulatory protocols. According to the Animal Health Institute, on average the world spends about one-fortieth of the amount on animal medicines as it devotes to human medicines. This investment covers the world's 24 billion chickens, more than 1 billion cattle and sheep, 750 million pigs and goats, 500 million dogs and 400 million cats. The construction of NBAF in Manhattan combined with the existing concentration of animal health entities in the Corridor and the proximity to research farms and livestock at K-State present an opportunity for Kansas to be a leader in the development of animal health products necessary to raise healthy livestock and protect the food supply in the United States and around the globe.

Unlike many sectors of the U.S. economy that experienced significant struggles in the past decade, the bioscience-based economy weathered the challenging economic times better than most industries. Though the prospects for continued growth in this sector remain strong, there are specific criteria necessary to sustain a growing animal health and bioscience industry. In addition to challenges related to reduced funding resources, according to a report by Battelle and BIO, there are also threats from international competition in this sector from both first-world and developing nations. The report highlights several factors which are critical in order for the U.S., and specific states within the U.S., to remain competitive:

1. Research funding,
2. Science-based regulatory systems,
3. Strong intellectual property protections,
4. Government trade actions that sustain and improve the openness of international markets for U.S. bioscience goods and services,
5. Federal and state tax policies and incentive systems that sustain industry competitiveness, and
6. Education and workforce development programs providing a skilled workforce.

OPPORTUNITIES

In order to develop a strategic growth plan for the animal health sector, it is important to understand the areas where Kansas has a comparative advantage and the best opportunities for growth or expansion.

Factor	Implications for Growth and Development Opportunities
Business Development	<p>The state of Kansas offers a variety of incentive programs for qualified companies involved in bioscience in addition to the many local economic development programs throughout the state. These incentives, which may be subject to approval by the Kansas Department of Commerce, range from specific tax exemptions and credits to workforce assistance and more.</p>
Critical Infrastructure	<p>Whether by highway, rail or air, Kansas offers excellent transportation and marketing advantages. Kansas' strategic location, at the convergence of I-35 and I-70, places it at the crossroads of America. Our central location and excellent transportation network with access to interstate rail, trucking and air corridors put businesses within next-day freight service of 70 percent of the U.S.</p> <p>Highways Kansas ranks sixth for quality and access to transportation, and third nationally in total road mileage with approximately 140,000 total road and street miles and over 10,000 highway miles.</p> <p>Rail Service Kansas ranks in the top 10 in the United States in railroad mileage with almost 4,800 miles of track. The Kansas City area ranks as the second leading rail center in the nation.</p> <p>Air Service Kansas City International Airport, the Wichita Eisenhower National Airport and the Manhattan Regional Airport are the largest airports serving the state, providing businesses with immediate access to major markets nationwide. KCI and Wichita contain state-of-the-art cargo handling facilities, with main-deck loaders capable of handling the world's largest freighter aircraft.</p> <p>Garden City Regional Airport offers service to Dallas/Fort Worth and Dodge City Regional Airport offers service to Denver. Salina Regional Airport offers service to Denver.</p>

OPPORTUNITIES (cont'd)

Factor	Implications for Growth and Development Opportunities
Education Resources	<p>The College of Veterinary Medicine at Kansas State University is ranked among the nation's top veterinary medicine schools. In addition, the College of Agriculture's Department of Animal Science and Industry is one of the largest in the country. The department maintains research facilities for beef cattle, dairy cattle, swine, poultry, horses and sheep which are located in close proximity to campus. The department manages about 6,500 acres of land for research purposes. In a typical year, departmental research and teaching facilities accommodate about 2,000 to 3,000 cattle, 3,500 swine, 1,500 laying hens, 250 sheep and 45 horses.</p> <p>The University of Kansas offers degrees in bioscience-related fields. Fort Hays State University offers majors in animal science and pre-veterinary medicine. Wichita State University and Emporia State University offer a pre-veterinary medicine degree. In addition, 39 of the state's colleges, community colleges and technical schools offer degree or certificate programs in animal science, agriculture pre-veterinary medicine or a bioscience-related field.</p>
Established Animal Health Industry	<p>Kansas is located within the KC Animal Health Corridor, the world's largest concentration of animal health companies. The combination of private companies, veterinary schools and other animal health related fields of study, research facilities, technical training programs, and transportation capabilities make the Kansas City region an attractive location for animal health businesses — from initial start-ups to relocations or expansions.</p> <p>Significant to a thriving animal health sector is discovery of new technologies, including therapeutics, diagnostics, biologics, and nutrition and feed products, a process which requires funding for research and development and more. Since 2009, bioscience firms in Kansas have received \$110 million in venture capital investments, with the majority directed toward animal biotechnologies. The Kansas State University Institute for Commercialization is dedicated to the start-up and expansion of technology-based, high-growth enterprises and enabling the commercialization of university and under-utilized corporate intellectual property.</p> <p>Key communities and regions within the Corridor have also taken proactive steps to recruit and support animal health and high tech enterprises to the region. Knowledge Based Economic Development is an economic development partnership between K-State, Manhattan Area Chamber of Commerce, North Central Kansas Community Network, KSU Institute for Commercialization, KSU Foundation, KSU Research Foundation and the City of Manhattan that works to recruit and support knowledge-based companies, including animal health and bioscience companies, to the Manhattan region. In addition, the Bioscience & Technology Business Center, a partnership of the City of Lawrence, Douglas County, Kansas Department of Commerce, University of Kansas and the Lawrence Chamber of Commerce, provides support to grow the bioscience and technology industries in northeastern Kansas.</p>

OPPORTUNITIES (cont'd)

Factor	Implications for Growth and Development Opportunities
Established Research Capabilities	<p>After a three-year selection process, Kansas was selected among 29 applications and 34 potential sites around the United States to be home to NBAF, a biocontainment laboratory facility that will provide state-of-the-art infrastructure for developing vaccines, performing diagnostics, and developing countermeasures against large animal foreign animal diseases and zoonotic diseases. NBAF will include biosafety level-4 laboratory and will replace the aging Plum Island Animal Disease Center in New York. NBAF is expected to be operational by 2022 or 2023.</p> <p>In addition to NBAF, the Biosecurity Research Institute (BRI) is also located on K-State's campus. The BRI is a BSL-3, ABSL-3 and BSL3-Ag facility. It is also a biocontainment research and education facility that supports "comprehensive farm-to-fork infectious disease research programs that address threats to plant, animal and human health." The facility includes 113,000 square feet of lab, education and administrative space. As of spring 2016, the BRI is operating at full utilization with research capabilities for zoonotic diseases, animal-only pathogens and microbes involved in plant diseases.</p> <p>K-State is also home to the Beef Cattle Institute, the Center for Excellence for Emerging and Zoonotic Animal Diseases, the Center of Excellence for Vector-Borne Diseases, the Center for Epithelial Research, the Arthropod-Borne Animal Diseases Research Unit, the Center for Grain and Animal Health Research, the Center for Outcomes Research and Education, Epidemiology and Population Health, the Institute for Computational Comparative Medicine, the Midwest Institute for Comparative Stem Cell Biology, the Nanotechnology Innovation Center of Kansas State, and the U.S.–China Center for Animal Health.</p> <p>With approximately half of the animal health and bioscience companies in the KC Animal Health Corridor with locations in Kansas, there is also a strong private sector research presence. In addition, private research-based enterprises are located in Kansas that partner with animal health companies to conduct research projects and trials on specific animal health products.</p>
Leader in Livestock Production	<p>The beef cattle sector has been and continues to be the single largest sector in the Kansas agriculture industry, with cattle and calves generating \$7.75 billion in cash receipts in 2013, which account for more than 49 percent of Kansas agricultural cash receipts that year. Kansas has the third largest number of cattle on ranches and feedyards in the U.S., numbering 6.25 million on Jan. 1, 2016. Kansas is also home to 143,000 dairy cows on 325 dairy farms, 1.8 million head of pigs, and is ranked 12th nationally in sheep and lamb production and 13th in the United States in meat goat production. Kansas is also home to innovative and high value egg laying and poultry genetic companies.</p> <p>The state is also recognized for its strength in meat processing, ranking third nationally in red meat production with production capacity of more than 5 billion pounds annually. There is also a growing presence of dairy processing facilities throughout the state.</p>

OPPORTUNITIES (cont'd)

Factor	Implications for Growth and Development Opportunities
Policy Environment	<p>At the federal level, Kansas is fortunate to have elected members of Congress who strongly support the animal health industry. The Kansas congressional delegation will play an important role in influencing positive changes related to federal regulations or legislation, and will be supportive of efforts to expand the animal health sector.</p> <p>There also exists a strong commitment among state leaders to support and provide an environment that encourages growth in the animal health sector.</p>
Qualified Workforce	<p>The animal health industry is known for creating high-wage, family-sustaining jobs with average wages 80 percent greater than the overall private sector and growing at a faster rate. In 2012, the average annual bioscience wage was \$62,823, compared to \$41,822 as the average Kansas wage. These jobs often require college-level education and, potentially, specific training.</p> <p>In Kansas there are more than 13,000 individuals employed in 810 bioscience-related firms. Additionally, the percentage of Kansans who have a high school diploma or higher exceeds the national average, and 571,000 Kansans hold a bachelor's degree or higher.</p>

SUCCESS STORIES

Due to the combination of a strong animal health presence in private industry, universities and other educational institutions and strong support from state government, the animal health industry in Kansas has experienced growth in recent years.

- The KC Animal Health Corridor is home to more than 300 animal health companies, representing the largest concentration in the world. Since 2006 when the Corridor was officially launched, 31 animal health companies have located in the Corridor. Companies with a business location within the Corridor represent 75 percent of the worldwide sales of animal health products and diagnostics, which represents just over \$19 billion.
- After a three-year site selection process, the U.S. Department of Homeland Security selected Manhattan, Kan., to be the home for NBAF, which will strengthen the nation's ability to conduct research, develop vaccines, diagnose emerging diseases and train veterinarians.
- Kansas has been and continues to be a recognized leader in preparing for animal health emergencies. The Kansas Department of Agriculture regularly exercises emergency response plans to help KDA and all partners better understand roles and responsibilities in a response, and to identify potential gaps in the plans.
- A significant number of well-respected public and private education and research centers are already located in northeast Kansas.
- Millions of dollars have been invested in Kansas by private animal health and bioscience companies that have chosen to locate or expand operations.

CHALLENGES

Identifying challenges, ranging from policy-related barriers to consumer perception of animal health products and their uses, and developing solutions will be key to future growth in the animal health sector in Kansas.

Challenge	Details of Challenge
Consumer Perception	<p>The foundation of a safe food supply is healthy animals, but some individuals and organizations provide misleading information, and oftentimes non-science-based, regarding tools and technologies used to prevent and treat animal diseases. Terms like organic, natural, antibiotic-free and hormone-free are often used to imply food safety and quality claims that are scientifically unfounded and are misleading to consumers. This presents a tremendous challenge to the ability of farmers and ranchers to safely and judiciously use animal health products in their efforts to raise healthy animals.</p>
Critical Infrastructure	<p>There exists significant potential to grow the animal health industry in Kansas, especially around the construction of NBAF, but there is a need for more organized communication and coordination among industry, academia and government. Similarly, increased transparency about research at NBAF as well as private companies would contribute to improved animal health as a whole.</p> <p>As communication and coordination among partners in this sector develops, there will be significant need to address concerns related to intellectual property in the research and development of animal health products.</p> <p>In the past, according to a 2014 report by the Brookings Institute, some federal laboratories have been managed in a manner that does not fully integrate with the regional economy or capitalize fully on the potential to partner with private industry, especially small- and medium-sized enterprises, on research initiatives. It will be critical to work alongside the Department of Homeland Security and the U.S. Department of Agriculture in the development of strong partnerships with state government, private industry and universities to maximize potential of the lab.</p>
Evolving and Emerging Diseases	<p>Agriculture is a biological production system, and thus, inherently faces challenges related to the evolution and adaptation of organisms, including pathogens and diseases. Identifying, developing vaccinations against and protocols to address new and emerging diseases will continue to be a challenge for the animal health industry.</p> <p>According to the World Health Organization, about 75 percent of emerging diseases are zoonotic. Currently, there is not a laboratory in the United States that can research and work on zoonotic diseases, and also develop vaccines and countermeasures to those zoonotic diseases, which affect livestock.</p>

CHALLENGES (cont'd)

Challenge	Details of Challenge
Growing Global Population	<p>As the global population climbs and is expected to surpass 10 billion within the next 50 years, farmers and ranchers will be faced with the challenge of producing food for nearly 3 billion additional people without using additional land. Further, as incomes increase and the global middle class grows, the demand for animal production will also increase.</p> <p>This presents an enormous challenge to the animal health industry as it will have to develop breeding and genetic improvement technologies, enhanced nutrition and feed products, and pharmaceuticals and vaccines to enable farmers and ranchers to increase production of safe, nutritious protein products.</p>
International Trade	<p>While there are significant opportunities to expand the animal health and bioscience sectors in Kansas and across the United States, there remains increasing competition from around the globe in the research, development and manufacturing of animal health products. In order to remain competitive, there needs to be a strong focus on adequate funding and support for research, a science-based regulatory system and strong protections for intellectual property, according to Battelle and BIO.</p>
Policy	<p>Antibiotics are an important tool to prevent, treat and control disease in animals. Multiple federal agencies, including the Centers for Disease Control and Prevention, Food and Drug Administration and USDA along with veterinarians, animal health companies and livestock producers, work together to ensure antibiotics, vaccines and other animal health tools are used safely and judiciously in order to protect human health. Despite efforts to ensure that animal antibiotics do not affect public health, there are some lawmakers who continue to call for increased scrutiny and regulation on the use of antibiotics in food-producing animals.</p> <p>The federal government has in recent years increased the regulatory environment surrounding the use of antibiotics and other animal health products in food producing animals. Most recently, the FDA has updated rules related to the use of certain antibiotics in food-producing animals, including amending its Veterinary Feed Directive (VFD) regulations to bring them in line with the other rule changes, bring all medically-important antibiotics used in feed and water from an over-the-counter status to VFD status.</p> <p>Funding for animal health and bioscience-related research will continue to be a challenge. Concern regarding the availability of vaccines for FMD and avian influence (AI) were raised during the NBAF summits with industry held in 2015 and 2016.</p> <p>In addition, the research and development of vaccination strategies and protocols for foreign animal diseases, including FMD, is and will continue to be a challenge for industry, government and academic partners to address.</p>

CHALLENGES (cont'd)

Challenge	Details of Challenge
Policy (cont'd)	Elected officials and regulators will continue to have considerable influence over the ability to use animal health products, and there will continue to be challenges when politics and personal agendas are the basis for statutory or regulatory changes rather than sound science. Further there seems to be a lack of understanding of the role NBAF will have in the safety and security of animal health, human health and the global food supply.
Workforce Development	<p>Growth in the animal health industry will require a skilled workforce, which continues to be a significant challenge throughout the entire agricultural industry. Not only will growth in the animal health and bioscience sectors require a highly skilled and specialized workforce to meet high-tech positions in federal, university and private laboratories, but there will also be a significant need for workforce to maintain those labs, participate in and conduct research projects and more.</p> <p>In addition, a decline in the number of graduates from the K-State College of Veterinary Medicine with a focus on large animal medicine presents a challenge throughout the livestock industry.</p>

NEXT STEPS IN STRATEGIC DEVELOPMENT

The development of a long-term growth strategy will require input and discussion among key partners. The following strategies have been identified as next steps in developing a strategic growth plan for the animal health industry.

Focus Area	Solution
Business Development	Work with key partners in the public and private sectors to ensure economic development programs applicable to the animal health sector meet the needs of potential new businesses. Coordinate with the KC Animal Health Corridor as well as local and regional economic development programs to promote Kansas as the knowledge base for animal health and bioscience. Develop a database of federal programs available to assist start-up companies such as the USDA Small Business Innovation Research fund.
Industry Outreach	The Kansas Department of Agriculture will work with key partners to create stakeholder lists, roles for each partner and priorities for the continued growth of the animal health sector in Kansas.

OPPORTUNITIES TO EXPAND PRESENCE

Initial list of potential opportunities:

- Develop an organized effort to recruit animal health companies and animal health research facilities to Kansas.
- Develop partnership between animal health companies, livestock industry and K-State to coordinate on-farm research needs on university farms.
- Coordinate public-private partnerships between NBAF and animal health companies to develop vaccines and share research space to help raise healthy animals.
- Develop business incentives to help recruit animal health companies to Kansas, and specifically, to close proximity to NBAF, with a focus on economic development and global competitiveness.
- Kansas has the opportunity to become the global center for animal health research, education and training. With state-of-the-art federal and university labs and world-class educational offerings at the state's universities, there is a strong foundation for animal science and bioscience education. By further leveraging community college bioscience courses and training and technical schools laboratory technician trainings, there is a premier opportunity to develop a robust workforce necessary to meet the growing demands of a vibrant animal health and bioscience industry. Taking advantage of these opportunities will help develop an environment in which animal health and bioscience companies need to look no further than Kansas to develop their workforce.
- Establish a robust educational effort to ensure policymakers at the federal level and within neighboring states have a full understanding of the importance of NBAF to animal health, human health and the global food supply.

OBJECTIVE

Based on feedback and information gathered from stakeholders and key partners at the Agricultural Growth Summit in August 2016, specific growth objectives for the Kansas animal health industry will be developed.

Kansas AG SUMMIT

GROW SMARTER. GROW STRONGER. GROW KANSAS.

KANSAS STRATEGIC AGRICULTURAL GROWTH ANIMAL HEALTH — NOTES

MEETING SUMMARY

From April to June 2016, Kansas Department of Agriculture executive and agricultural marketing team members met with animal health industry representatives, researchers and local economic development leaders. Individuals identified for the one-on-one conversations represented both small and large businesses and ranged in geography throughout the state. Many expressed that the existing concentration of the sector and the strong livestock industries make Kansas a good place to grow. Common themes of challenges impacting the growth of the animal health industry in the state included money (public and private dollars to support start-up companies) and coordination between NBAF and private industry.

Consumer

- Need to continue consumer education regarding importance of animal health technologies

Finance and Capital

- Greater public capital investment in other states is a threat to growth of the industry
- Access to capital for start-ups
- Need to better understand how we can support start-ups and emerging animal health companies in the state (Angel 1 investment)
- Lack of venture capital/early stage capital in the middle of the country

Research

- Private sector research capability is important
- How do we educate the federal delegation and elected officials outside of Kansas about the need for increased animal health research?
 - Need for more research on emerging diseases and zoonotic diseases
- Need to reinvigorate state funds for all animal health research (explore public-private arrangements)
- There is a long-term goal to establish a center for animal health economics at K-State

Rules & Regulations

- Traceability will become a major topic
 - Can be used as a selection tool and for information sharing
 - Will most likely happen due to an animal disease outbreak, big retailers demand it, or a price premium



- PEAK program: Needs revised in order to better serve companies' needs at the right time (do not qualify for program when they need it, but do qualify later in process when they no longer need it)

Transportation and Infrastructure

- There is opportunity for NBAF to have one production facility that companies rent and utilize in conjunction with research at NBAF

Water and Natural Resources

- Land for businesses to expand is a strength of Kansas

Workforce and Quality of Life

- Lack of animal health economists is a challenge
 - Very few economists in the industry, but there is large demand for animal health economics work
 - Potential need for a masters' program in animal health economics?
- Manufacturing in animal health corridor
 - Mistakes made by employees is costly
 - Have to spend a large amount of money to train employees

Other

- NBAF is a validation of what Kansas has to offer
 - How will NBAF work with trusted international partners?
- While the concentration of animal health companies in the Animal Health Corridor is a major benefit for the region, the ongoing consolidation of animal health companies can be a challenge as the region works to keep newly merged companies within the region
- Consider bringing the bio-industry in Kansas together to hold a roundtable once a year
 - Allows public to listen to private sector discussion about needs, opportunities, challenges and vice versa
- Getting federal leaders to the state is an opportunity for Kansas (elected/committee chairs who aren't from Kansas)
- The environment that needs to exist to recruit high-tech businesses to the state includes university, public and private (federal lab is key in this)
 - All partners complement each other
- Opportunity to manage intellectual property for NBAF
- In regards to emergency preparedness, where will development/increase of vaccine production happen in the event of an outbreak?
- Local emergency response will be important should someone be exposed during an outbreak
- Are there opportunities to educate lenders about emergency preparedness at the state level?

Potential Action Items

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